

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: **Abdul-Ridha, et al.** )

Serial No.: \_\_\_\_\_)

Filed: \_\_\_\_\_ )

For: "Improved Structures Based on  
Ceramic Tantalum Nitride"

This is a Rule 1.53(b) divisional of the parent United States application entitled “Method for Fabrication of Ceramic Tantalum Nitride and Improved Structures Based Thereon,” Serial No. 09/512,397 filed February 24, 2000, and assigned to the assignee of the present application.

**PRELIMINARY AMENDMENT TO DIVISIONAL APPLICATION**

Honorable Commissioner of  
Patents and Trademarks  
Washington, D. C. 20231

Dear Sir/Madam:

This amendment is directed to the accompanying 37 CFR §1.53(b) divisional application. This divisional application is classified in Class 361, Subclass 305. The pending parent application Serial No. 09/512,397 is classified in Class 438, Subclass 710 in Art Unit 2831. Please enter the following amendments in the present Rule 1.53(b) divisional application.

**In the Title:**

Please delete the title “Method for Fabrication of Ceramic Tantalum Nitride and Improved Structures Based Thereon” and replace with --Improved Structures Based on Ceramic Tantalum Nitride--.

**In the Specification:**

After the title, please insert the sentence: --This is a divisional of application Serial No. 09/512,397 filed February 24, 2000.--

**In the Claims:**

Please cancel claims 1-6 and 12-20.

Please add the following new claims:

--21. A structure comprising:

a first capacitor electrode comprising a bottom copper interconnect metal segment;

a first barrier layer over said bottom copper interconnect metal segment;

a copper seed layer over said first barrier layer;

a dielectric comprising tantalum nitride over said copper seed layer;

a second barrier layer over said dielectric;

a second capacitor electrode comprising a top copper interconnect metal

segment.--

--22. The structure of claim 21 wherein said structure is fabricated in a single ionized metal plasma tool.--

--23. The structure of claim 21 wherein said first capacitor electrode, said first barrier layer, said copper seed layer, said dielectric, said second barrier layer, and said second capacitor electrode are fabricated in a single ionized metal plasma tool.--

--24. The structure of claim 21 wherein said first barrier layer comprises metallic tantalum nitride.--

--25. The structure of claim 21 wherein said second barrier layer comprises metallic tantalum nitride.--

--26. The structure of claim 21 wherein said first barrier layer comprises metallic tantalum nitride having a nitrogen content of approximately 21%.--

--27. The structure of claim 21 wherein said second barrier layer comprises metallic tantalum nitride having a nitrogen content of approximately 21%.--

--28. The structure of claim 21 wherein said dielectric comprises tantalum nitride having a nitrogen content of at least 30%.--

--29. The structure of claim 21 wherein said dielectric comprises tantalum nitride having a nitrogen content of approximately 60%.--

--30. The structure of claim 21 wherein said dielectric comprises ceramic tantalum nitride.--

--31. The structure of claim 22 wherein a percentage of nitrogen partial flow in a mixture of gases in said ionized plasma tool is adjusted so as to cause a nitrogen content in each of said first and second barrier layers to be approximately 21%.--

--32. The structure of claim 22 wherein a percentage of nitrogen partial flow in a mixture of gases in said ionized plasma tool is adjusted so as to cause a nitrogen content in said dielectric to be at least 30%.--

--33. The structure of claim 22 wherein a percentage of nitrogen partial flow in a mixture of gases in said ionized plasma tool is adjusted so as to cause a nitrogen content in said dielectric to be approximately 60%.--

--34. A capacitor comprising:  
a first capacitor electrode comprising a bottom interconnect metal segment;  
a first barrier layer over said bottom interconnect metal segment;  
a seed layer over said first barrier layer;

a dielectric over said seed layer;

a second barrier layer over said dielectric;

a second capacitor electrode comprising a top interconnect metal segment, wherein said bottom interconnect metal segment, said first barrier layer, said seed layer, said dielectric, said second barrier layer, and said top interconnect metal segment are fabricated in a single tool.--

--35. The structure of claim 34 wherein said single tool is a single ionized metal plasma tool.--

--36. The structure of claim 34 wherein said bottom interconnect metal segment comprises copper.--

--37. The structure of claim 34 wherein said top interconnect metal segment comprises copper.--

--38. The structure of claim 34 wherein said first barrier layer comprises metallic tantalum nitride.--

--39. The structure of claim 34 wherein said second barrier layer comprises metallic tantalum nitride.--

--40. The structure of claim 34 wherein said first barrier layer comprises metallic tantalum nitride having a nitrogen content of approximately 21%.--

--41. The structure of claim 34 wherein said second barrier layer comprises metallic tantalum nitride having a nitrogen content of approximately 21%.--

--42. The structure of claim 34 wherein said dielectric comprises tantalum nitride having a nitrogen content of at least 30%.--

--43. The structure of claim 34 wherein said dielectric comprises tantalum nitride having a nitrogen content of approximately 60%.--

--44. The structure of claim 34 wherein said dielectric comprises ceramic tantalum nitride.--

--45. The structure of claim 35 wherein a percentage of nitrogen partial flow in a mixture of gases in said ionized plasma tool is adjusted so as to cause a nitrogen content in each of said first and second barrier layers to be approximately 21%.--

--46. The structure of claim 35 wherein a percentage of nitrogen partial flow in a mixture of gases in said ionized plasma tool is adjusted so as to cause a nitrogen content in said dielectric to be at least 30%.--

--47. The structure of claim 35 wherein a percentage of nitrogen partial flow in a mixture of gases in said ionized plasma tool is adjusted so as to cause a nitrogen content in said dielectric to be approximately 60%.--

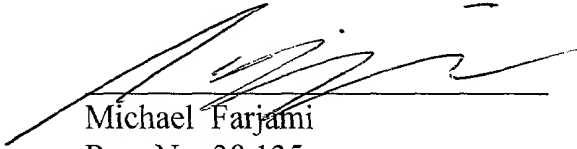
**REMARKS**

This is a divisional application of the pending parent application, Serial No. 09/512,397 filed February 24, 2000. This divisional application is filed during the pendency of the parent application. By this preliminary amendment, applicant has canceled claims 1-6 and 12-20 and has added new claims 21-47. Accordingly, claims 7-11 and 21-47 remain in the present Rule 1.53(b) divisional application. Consideration and examination of pending claims 7-11 and 21-47 is respectfully requested.

A true and correct copy of the parent application, including the specification, drawings and claims, as originally filed, is enclosed. Also enclosed is a true and correct copy of the combined declaration and power of attorney as filed in the parent application. Please direct all correspondence and communications to the undersigned attorneys of record.

Respectfully submitted,  
FARJAMI & FARJAMI LLP

Date: 1/16/01

  
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